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Aspicilia, Lobothallia, and *Rhizocarpon* species new for Turkey and Asia

Kenan Yazici *[1] & Ali Aslan [2]

[1]*Biology Department, Faculty of Science, Karadeniz Technical University, 61080, Trabzon, Turkey*

[2]*Atatürk University, Kazım Karabekir Education Faculty, Biology Dept., Erzurum, Turkey*

* Correspondence to: *kcagri_1997@yahoo.com*

Abstract — Three lichen species, *Aspicilia glomerulans*, *Lobothallia chadefaudiana,* and *Rhizocarpon furfurosum,* were identified as new to Turkey and Asia during a lichenological survey in the Burdur and Muş regions (Turkey). Descriptions accompany notes on known distribution, substrates, and chemistry and comparisons with morphologically similar taxa.

Key words — ascomycetes, biodiversity, *Hymeneliaceae, Megasporaceae*, *Rhizocarpaceae*

Introduction

Although many new lichen species have recently been recorded for Turkey (Aptroot & Yazici 2012, Arslan et al. 2011, Yazici et al. 2010a, b, c, 2011a, b, 2012, Karagöz & Aslan 2012, Karagöz et al. 2011, Kinalioğlu & Aptroot 2011, Osyczka et al. 2011, Vondrák et al. 2012), more surveys are still needed of unexplored regions in the country.

Rhizocarpon (*Rhizocarpaceae*) contains more than 200 crustose species (Miadlikowska et al. 2014, McCarthy & Elix 2014), which are found on siliceous rocks in montane and boreal habitats and (rarely) on substrates in wet or dry (sub)tropical areas and hot-arid regions (McCarthy & Elix 2014). *Aspicilia* (*Hymeneliaceae*) contains approximately 230 species (Nordin et al. 2010), while *Lobothallia* (*Megasporaceae*) has 12 lichen taxa (Sharnoff 2014).

Thirty-eight taxa of *Aspicilia,* three taxa of *Lobothallia*, and 30 taxa of *Rhizocarpon* have thus far been reported from Turkey. Of the approximately 1650 lichen taxa recorded for the country, only 37 lichenized fungi have been

reported from Burdur Province (Aslan & Yazici 2013, Çobanoğlu 2005, Öztürk et al. 2005, Pišút & Guttová 2008, Şenkardeşler 2009, Yazici et al. 2013).

The present contribution results from fieldwork in the regions of Burdur, southwestern Turkey, and Muş, eastern Turkey. We report here three new records for Turkey and Asia.

Materials & methods

Specimens

Air-dried samples were examined with a Nikon SMZ1500 stereomicroscope and a Nikon Eclipse 80i compound light microscope. Relevant keys were consulted (McCarthy & Elix 2014, Clauzade & Roux 1985, Poelt 1970, Roux 1977, Smith et. al. 2009) for the identifications. Vouchers are stored in the Herbarium of the Biology Department, Karadeniz Technical University, Trabzon, Turkey (KTUB). The descriptions are based on Turkish specimens.

Description of the study area

Areas visited were the Ağlasun, Altınyayla, and Tefenni districts in Burdur and the center and Bulanık and Varto districts in Muş. Burdur, which is very mountainous and covered with mixed forests (*Abies*, *Cedrus*, *Ficus*, *Fraxinus*, *Juniperus*, *Olea*, *Pinus*, *Pistacia*, *Prunus*), has a continental Mediterranean climate with cold snowy winters and long dry and very hot summers. Muş province, which encompasses vast areas of grassy meadows and steppe and high mountains with occasional to rare *Quercus* communities and *Salix* trees, has a climate characterized by very cold snowy winters, and short hot dry summers (Baytop & Denizci 1963, Akman 1999).

Taxonomy

Aspicilia glomerulans (Poelt) Poelt, Mitt. Bot. Staatssamml. München 8: 202 (1970) Fig. 1

Thallus crustose, to 7 cm diam, K–, areolate, with black hypothallus, rounded, 0.5 mm thick, dark white or dark-grey, paler at the middle, dark grey-brown towards the outer margin of the lobes; surface with numerous isidia-like papillose branches, dispersed or aggregated on one areole or many areolae; apothecia present or absent, 0.8–1 mm diam., single, rounded, disc flat, concave later, black, edge flat, black, ± rounded, disappearing later; ascospores ellipsoid, 16–19 × 6–12 µm, with granules; hymenium 130 µm high, pale, I+ blue; asci cylindrical, 8-spored, thick and contrasting tholus, strongly regressed at maturity, I ± blue; paraphyses barely in water, upper parts moniliform and anastomosing in K.

Ecology—Associated species: *Aspicilia cinerea*, *Candelariella vitellina, Melanohalea infumata, Parmelina tiliacea, Physcia caesia, P. cernohorskyi, Rhizoplaca chrysoleuca*, *R. melanophthalma,* and *Xanthoria elegans.*

Specimen examined – **TURKEY**. **Burdur:** Altınyayla, between İbecik-Altınyayla mainroad side, 36°58′07.19″N 29°26′17.70″E, 1348 m, on calcareous rock, 29.06.2012.

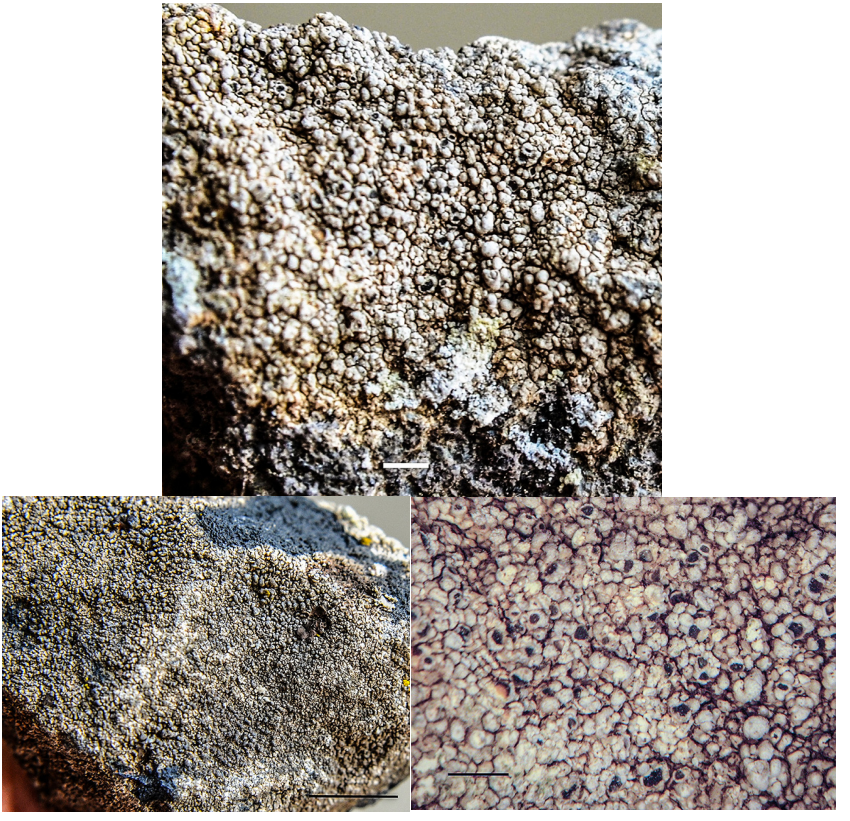

Fig. 1. *Aspicilia glomerulans*, habitus
(top: with apothecia & papilla; left: with papilla; right: with apothecia & papilla).
Scales top,right = 1 mm; left = 1 cm

leg. K.Yazici. (KTUB–2427), **Muş:** Varto, Çallıdere village, roadside, 39°16′24.70″N 41°14′18.26″E, 1705 m, on calcareous rock, 01.07.2015, leg. K.Yazici. (KTUB–2445).

Remarks—*Aspicilia glomerulans,* which is primarily sterile, grows on calcareous rock. The species is morphologically similar to *Koerberiella wimmeriana,* which differs by its grey-rose to grey thallus, cylindrical papillose isidia, shorter pycnidiospores (4–5 × 1 µm), larger apothecia (0.5–2 mm in diam.), and larger ascospores (20–35 × 11–20 µm) (Clauzade & Roux 1985, Poelt 1970, Thüs & Schultz 2009). For additional details, see Poelt (1970).

Aspicilia glomerulans has previously been reported from Austria (Alps), Greenland, North America, and Norway (Clauzade & Roux 1985, Poelt 1970). This is a first record for Turkey and Asia.

Fig. 2. *Lobothallia chadefaudiana,* habitus (apothecia and thallus lobes). Scale = 1 mm

Lobothallia chadefaudiana (Cl. Roux) A. Nordin, Cl. Roux & Sohrabi, Bull. Soc. Linn. Provence, num. spéc. 16: 216 (2012) Fig 2

Thallus crustose, pale white to grey white, 1.7– 3 cm in diam., squamules, to 2 mm in diam.; surface with papillose, ± pruinose, rounded, ± lobed, spot tests negative; cortex ≤85 µm high, photobiont *Trebouxia.* Medulla ≤1300 µm; apothecia to 2 mm diam., ± immersed, in squamules in 1–2 groups, irregular in shape, disc concave, flat later, ± grey-blue, pruinose, K–, P–, C–; N–, with paraphyses with gelatinous sheath at the top, K–; hymenium 80–95 µm, colourless, without crystals, paraphyses 3–6 µm thick, strongly coherent, consistent, divided, green-brown, branched and anastomosing, I + blue later red; hypothecium 35–55 µm, colourless; asci clavate, thickened at the top, 80–95 × 20–30 µm, 8-spored, I+ blue, later red. Ascospores 9–17 × 6–12 µm.

Ecology—Associated species: *Acarospora cervina*, *Lecanora dispersa*, *Verrucaria nigrescens*, and *Diploschistes diacapsis*.

Specimen examined – **TURKEY**. **Burdur:** Ağlasun, 5 km to Çamlıdere village, 37°38′01.77″N 30°38′53.58″E, 1010 m, on calcareous rock, 17.07.2012, leg. K.Yazici. (KTUB–2423), **Muş:** Center, 200 m to Alaniçi village, roadside, 38°39′15.52″N 41°21′10.55″E, 1709 m, on calcareous rock, 29.05.2015, leg. K.Yazici. (KTUB–2447).

Remarks— *Lobothallia chadefaudiana* mostly grows on calcareous rock. It is morphologically similar to *Aspicilia cernohorskyana,* which is distinguished by larger apothecia and narrower squamules (Clauzade & Roux 1985, Roux 1977). For additional details, see Roux (1977).

Lobothallia chadefaudiana has previously been reported from Europe (France, Austria, Greece, Spain; Clauzade & Roux 1985, Roux 1977, Roux et al. 2008). This is a first record for Turkey and Asia.

Fig. 3. *Rhizocarpon furfurosum,* habitus (with isidia). Scale = 1 mm

Rhizocarpon furfurosum H. Magn. & Poelt, Verh. Zool.-Bot. Ges. Wien 95 : 110 (1955) Fig. 3

Thallus crustose, effuse, to 1.2–4 cm diam., continuous to rimose-areolate, areoles to 1.2 mm diam., cracked, spreading, pale or dull-brown-grey to dark grey-brown, prothallus ± developed, covered with fragile isidia like blastidia minutely warted at first; isidia 0.01–0.03 mm long, fragile, branched. Areoles flat or ± convex. Hypothallus black. Apothecia absent. Thallus K+ yellow, C–; medulla K+ yellow, P+ yellow.

Ecology—Associated species: *Acarospora cervina, Bellemerea cupreoatra, Candelariella vitellina, Lecanora dispersa, Protoparmeliopsis muralis, Rhizocarpon geographicum*, and *Xanthoria elegans.*

Specimen examined – **TURKEY**. **Burdur:** Tefenni, Seydiler village, 37°14′47.46″N 29°48′24.83″E, 1191 m, on siliceous rock, 21.08.2013, leg. K.Yazici. (KTUB–2429), **Muş:** Bulanik, 5 km to Arakonak village, roadside 39°04′08.79″N 42°07′48.39″E, 1602 m, on calcareous rock, 30.06.2015, leg. K.Yazici. (KTUB–2446).

Remarks— *Rhizocarpon furfurosum*, which occurs on metal-rich siliceous rocks, is mostly sterile and is easy to overlook. For additional details, see Smith et al. (2009).

Rhizocarpon furfurosum has previously been reported from Europe (England, Germany, Scandinavia, the Czech Republic, Slovakia, Russia; Guttová et al. 2013, Smith et al. 2009 Steinová et al. 2009). This is a first record for Turkey and Asia.

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